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BULLETIN

OF

THE PENNSYLVANIA MUSEUM

APRIL, 1907

FIFTH YEAR

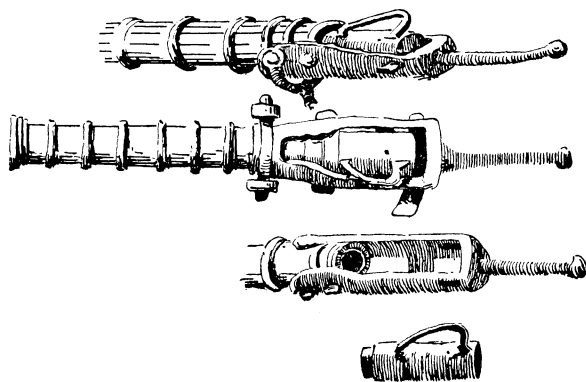
NUMBER 18

CANNON NOTES IN THE FAR OFF PAST

This very much pruned article refers to the breech-loading cannon lately purchased by the Museum. Such were called "Chambered" or "Chamber-Pieces," because of the iron chamber which played then the important part the powder cartridge does to-day. These little cannons also masqueraded under various aliases, such as "Murtherers," "Port-Pieces," even "Culverins," etc. It is hoped that this mere glance at the many named but not absolutely harmless little weapon may not be totally devoid of interest, especially as the gun in question seems to have been "made in China."

GUNPOWDER. Space lacking, I shall have to confine myself to merely stating the conclusions of the best authorities. One fact at least we can be sure of, that the detonating effect of gunpowder was impossible before the discovery of SALTPETRE, and of that salt we find no trace whatsoever in any of the many records until we reach the XIII. century; it was probably discovered about the second quarter of that century.

SALTPETRE, SAL-PETRÆ, salt of rock, as it is called in Friar Bacon's work, "De Secretis" (written before 1249), was, for some unknown reason, called by



1. CHAMBER-PIECE, OR FALCONET

Older form of built-up, hooped gun, circa 1450

Lowest piece, the "Chamber." Next above the wrought iron "Cradle," held in place by the trunnions

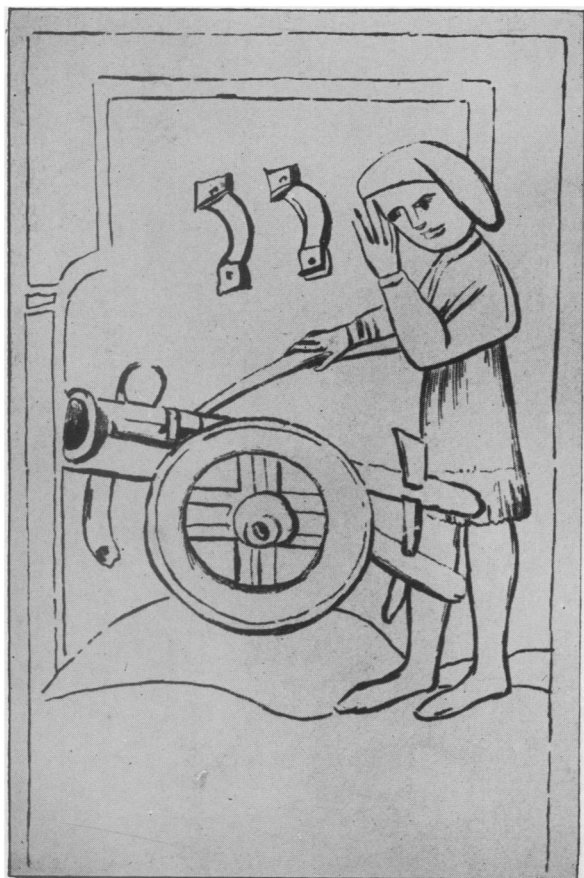
Next above, cannon ready for firing; a bit of the "Chase" removed to show position of ball

Upper view, the same from one side

Note the wrought iron "Tail," for aiming

(By courtesy of *The Mount Airy World*)

the Egyptian physicians "Chinese snow," and "barud" (*i. e.*, saltpetre) by the Arab people of the West. So says Abd Allah ibn al Baythar (Slave of Allah son of el Baythar), who died in Damascus, 1248.



2. PROBABLY THE EARLIEST CONTEMPORANEOUS DRAWING
OF A CANNON

Circa 1390 to 1400

From the original manuscript in the Royal Library, Munich

(By courtesy of *The Mount Airy World*)

General Fave and Napoleon III. place the discovery of the detonating principle of gunpowder between A. D. 1270 and 1320, but add that its importance was so little appreciated that it was scarcely noticed.

"There is no trustworthy evidence, so far as I am aware, that the Chinese invented gunpowder. The statements of the Jesuits on this particular matter are worthless. * * On the other hand, we possess a number of facts which point to the conclusion that the Chinese obtained their first gunpowder and firearms from the West" (Hime, p. 135). The Institutes of Timur, c. middle of the XIV. century, contains no mention of cannon or gunpowder, although full details are given of the equipment of his troops.

"Gunpowder came from the outer barbarians," says the WUH-LI-SIAO, published in 1630. This question will necessarily be again referred to under the head of "The Earliest Cannon."

INDIA. Prof. G. Oppert in an essay "On the Weapons, etc., of the An-

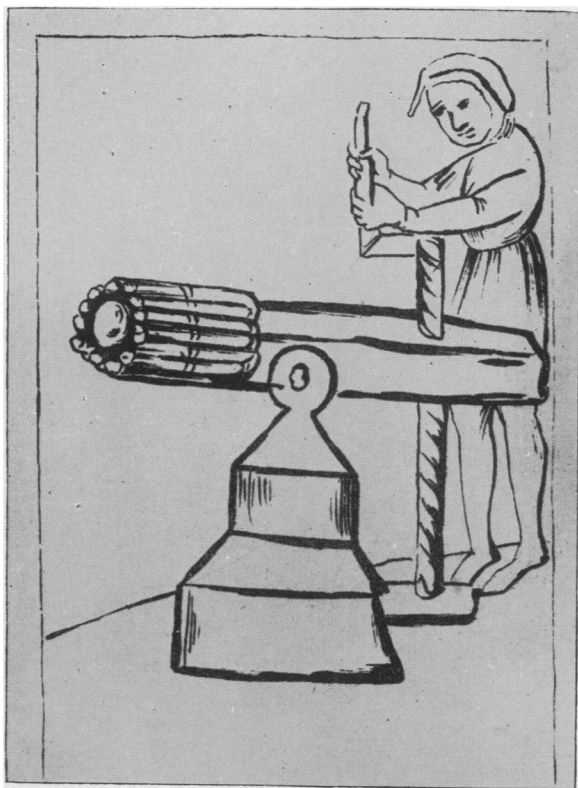
cient Hindus," London, 1880, proves, by the mistranslation of a very ancient Hindu work, the SUKRANITA, that the Hindus of that time possessed an explosive, which, for whatever reason, fell into disuse; he adds that "No Chinese work * * * can, with respect to antiquity, be compared with the SUKRAN-

ITA." Sir R. Burton, the eminent Orientalist, says, "Oppert shows no reason why the allusions to, and descriptions of, gunpowder and firearms should not be held modern interpolations into those absurd compositions."

ARABS. Colonel Hime, after going over the claims of these clever chemists (they gave us the word itself, *al*, the, *Kimya*, alchemy, the "black" art) and most advanced scientists of early ages, concludes, "By whomsoever gunpowder was invented, it was not by the Arabs" (p. 104).

Among Europeans who are credited with inventing gunpowder, are, "Marcus Græcus," who lived about the end of the VIII. century. His work, the *LIBER IGNIUM*, is a collection of receipts for human destruction ranging all the way from about the VII. century to A. D. 1300. There exist several MS. copies of this work, but no two contain the same number of receipts, the variation being from 22 to 35. Disregarding even internal evidence, the inference seems that the work is a collection of old receipts to which from time to time additions have been made, and that Marcus himself is a myth.

Far more interesting in every way is the claim of Friar Roger Bacon (1214? to 1294), "The Admirable Doctor," a Franciscan of Oxford, with most liberal views on the subject of heresy and alchemy, a man who ranked, outside of Moorish Spain, as the most illustrious scientist of his day. His "Epistola de Secretis Operibus Artis et Naturæ de Nullitate Majiæ" is thought to have been written before 1249. Part of the work "on account of the magnitude of the secrets" in it, as Bacon explains, is written according to some cryptic method, because, as he goes on to explain, "it is madness to commit a secret to writing, unless it be so done as to be unintelligible to the ignorant, and only just intelligible to the best educated."



3. THE EARLIEST CONTEMPORANEOUS DRAWING OF A GATLING GUN

1390 to 1400

From the original manuscript in the Royal Library, Munich

(By courtesy of *The Mount Airy World*)



4. BRONZE BREECH LOADING CANNON, OR CHAMBER-PIECE
Purchased with Income from the Temple Fund
Made in China about 1673

If the secret of the wise Friar has been guessed with even partial success, we may suppose that while he was "experimenting with some incendiary compositions * * * the mixture exploded and shattered all the chemical apparatus near it" (Hime, p. 161), including the celebrated "Brazen Head," a terrible misfortune, for, if Bacon had heard it speak he would have succeeded (?). The miraculous head spoke three times, but, unhappily, each time it was while Bacon slept; then it fell to the ground and was broken to pieces (unless it was blown to pieces) :

"Like Friar Bacon's brazen head, I've spoken,
"Time is, time was, time's past."

Don Juan. i. 217. Byron.

After the smash-up Bacon certainly knew well that powder exploded, but he never seems to have advanced the next step and discovered its projectile force.

Berthold Schwartz of Freiberg is the German inventor of gunpowder, but as he appears to have made his discovery between 1320 and 1330, and as there is an absolutely authentic case of the construction of metal cannon with iron balls in 1326, it does look as if Schwartz must have had some trouble getting out a patent on his invention.

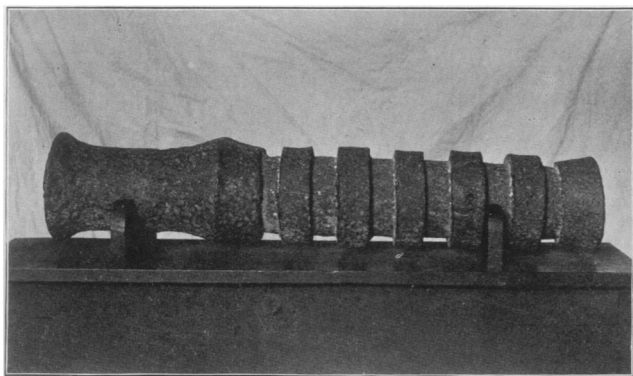
THE EARLIEST CANNON. The word *cannon* seems to come from *canna*, Latin, a cane or reed. Possibly hollow reeds were used, filled with Greek fire, attached to the end of lances, terrifying to horses and unpleasant to their riders. Later, the same may have been used for the projection, by force of gunpowder, of some small missiles; but of this we are not sure.

There exists in beautiful Florence a Latin document whose date and authenticity have never been questioned. It is a decree of the republic, dated February 11, 1326, giving power to the priors, the gonfalonier and to twelve good men, to appoint fit persons to superintend the manufacture of cannon of brass and iron balls (*pallotias ferreas et canones de metallo*). This is the very first authentic mention of cannon, and these little things for the defence of the Tuscan land are the ancestors of the huge destructive engines of to-day, with their 500 or more pound projectiles rending their way through the heaviest steel armor, and with a range measured in miles. What these little Florentine interlopers were like we shall never know, but considering that French cannon of twelve years later (1338) were charged with about an ounce of powder of the most miserable description, which feebly propelled a seven ounce arrow, in shape like a cross-bow bolt, we may rest assured that they were crude in construction with an effect of laughable mildness.

In 1338, however, we have unquestionable proof of the employment in England of cannons of brass and of iron (built up or wrought). John Starlyng, formerly clerk of the "Ships, Galleys, Barges, Balingers, and others of the King's vessels," and Helmyng Leget, keeper of the same; June 22nd, XII. Edward III. (1338). "The said John delivered to the said Helmyng * * * ij canons de ferr sans estuff" [two cannons of iron without ammunition (?)] * * * "un canon de ferr ove ii chambers, un autre de bras ove une chambre * * *"

A very interesting question is whether the English used cannon at Cressy in 1346, because if they did it would be the first recorded instance, so

far discovered, of the use of field artillery. The weight of opinion seems to prove that they had three or possibly four cannon. These would have been about the size of a blunderbus. Loading at that time was a long and wearisome job, the range was very short, the noise would have been drowned by the shouts of the fighters. With what amused amazement the seven thousand stalwart archers would have regarded such an aid, they who could twang their huge bows eight to ten times a minute, sending each time a "cloth yard arrow" two hundred and fifty yards with perfect certainty, piercing at that range armor of horse or man, armor of Milan or Germany. No portable weapon approached the long-bow in those hands until the advent of the modern repeating rifle.



5. IRON MUZZLE LOADING CANNON
Taken from the Great Wall of China in 1898
Given by Mr. R. E. Difenderfer

Edward III., immediately after his astounding victory, marched to Calais and began the siege of that town. He sent two letters to the Tower in London ordering cannon and ammunition, 20 guns with powder and lead. His guns probably threw small leaden balls, using charges of three to four ounces of powder.

Note that the "Chamber-Piece" appears at the very start. A conical shaped gun was also common. As soon as larger calibres were ventured upon the built-up system was introduced. It was briefly as follows: Bars of iron were placed longitudinally, about a core of the desired calibre, forming a cylinder the length of the gun. These bars were welded together and then strong hoops of iron were *driven*, not shrunk, along the cylinder. In the large "bombards," as they were called, such as the celebrated "Mons Meg," the "mickle mouthed murtherer," in Edinburgh Castle (made probably between 1450 and 1490), whose calibre is twenty inches and length some thirteen feet, the hoops are continuous; the powder chamber was of solid wrought iron, about half the calibre of the chase, to which it was either screwed or welded. These monsters fired stone balls, which were often strengthened by encircling iron bands.

The weak point in the Chamber-Piece was the impossibility of preventing the escape of very considerable gas at the breech. Bronze muzzie-loaders were cast about the first quarter of the XV. century, but as they were very costly on account of their material, the supply was perforce but limited. About the year 1500 cheap iron guns were cast, after which the breech-loader rapidly disappeared.

The effective range of cannon of the XIV. century was from 600 to 1000 paces.

The manner of loading the Chamber-Piece was as follows: Powder was put in the chamber and a wad or tampion of soft wood was driven down upon it. The ball, weighing from one to three pounds, was placed in the rear end of the bore, with a wad of straw or other soft material either side of it. The chamber was then put in place and forced against the end of the chase by the wedge driven in behind it. With *three* or *four* chambers the piece could be fired once in two minutes.

"When a gunner will give fire to a chamber-piece he ought not to stand on that side of the piece where the wedge of iron is put to lock the chamber of the piece, because the said wedge may through the discharge of the piece fly out and kill the gunner." These "quick-firing" guns were used, as the modern ones are, in the fighting tops of ships and were also placed on the "cage-works," the high, castle-like structures fore and aft (from whence "fore-castle"), to repel boarders, or sweep an enemy's deck. When used for this purpose they were loaded with "base, burr, musket, and other kind of murdering shot put up in bags or lanthorns." "The whole class of breech-loading guns seems to have soon lost favor. The reason is not clear, but doubtless it was due in a great measure to the growing importance of artillery attack in naval actions" ("Drake and the Tudor Navy," Corbett). So that after the Armada (1588), guns of the type we are studying seem to have been little used in European waters, which may possibly account for their appearance in the Orient. A Chamber-Piece similar to the one in question was captured in Korea by Admiral John Rogers, 1871, and is now preserved in the Museum at Annapolis.

A reason or two for supposing that the Art of Cannon Casting went from Europe to *China*. The first trustworthy account of the use of artillery in China is by a distinguished antiquary, Chao I., and was published in 1790. He states that the Emperor Yung Loh procured cannon in 1407. * * * As at that time there was constant communication between China and Europe by sea and land, there was nothing to prevent the Emperor getting cannon of any size (Hime, pp. 134, 136).

"In 1520 the heavy guns of the Portuguese ships at Canton attracted considerable attention and soon acquired the name of 'Franks' * * * The Chinese seem to have availed themselves of the assistance of the Portuguese and of their wonderful guns to punish their own pirates" ("China," etc. E. H. Parker, 1901, p. 83).

"These 'Franks,' we learn from the *Wu-pei-che*, were of iron, five or six *Ch'ih* (six or seven feet) long. * * * Five small barrels (chambers) were used, which were placed (successively) inside the body of the piece from which they were fired off" (Mayers, p. 96).

"The Chinese guns manufactured in 1618 were cast under the superintendence of the Jesuits at Peking" ("China." A. K. Douglas, p. 74).

TRANSLATION OF THE INSCRIPTION ON THE BRASS CHAMBER-PIECE:*

On the.....day of the 8th moon in the Kwei-chiu year [of the Sexagenary Cycle] was cast [this] fourth Frankish [Cannon]. No. 147. Weight, 97 catties.....
Superintendent of Founding, Shen Chi-huen,

Former General Officer.

Chin Tih-huan,

Former [Lord of] 10,000
Houses, and Military Com-
mander of this District.

Craftsman, Chin Ching-huen.

"The inscription, though in Chinese, is undoubtedly of Korean origin, as the names and official titles mentioned therein are Korean. If, as stated in your letter, the cannon was cast in the XVI. century, the year of the sexagenary cycle given corresponds to 1553."

For all the above the Museum is indebted to the courtesy of the Chinese Legation, Washington, D. C.

The years of the "sexagenary-cycles," "Kwei Chiu" (or Kui-ch'ou), mentioned in the inscription, might fall in September of the years (as well as before and after) 1553, 1613, 1673, etc., but as no regnal title is given, the *century* in which the gun was cast is indeterminable. There is, however, at the United States Naval Academy, Annapolis, a gun of similar form, differing in no essential from ours, the date of which is fixed by the inscription. This bears the name of the Emperor K'ang-hi, who reigned sixty years and died in 1722. The naval authorities date their gun 1665, and it is probable that ours is of very nearly the same decade, although the names of officers and artificers connected with the casting are all different. The two missionaries in charge of gun-casting at that time were Father Schaal and Father Verbiest.

The thanks of the Museum are also tendered to Professor Friedrich Hirth, Ph. D., Department of Chinese, Columbia University in the City of New York, who has been so very good as to examine the inscription on our cannon and to furnish us with information thereon, unattainable from any other source. Dr. Hirth, judging from certain peculiarities in the form of a character which occurs in the name of the Emperor K'ang Hi, is of the opinion that the date of our cannon is about 1673.

"From an old Chinese standard weight issued in 1679, ten taels of which represent exactly thirteen ounces," Dr. Hirth makes ninety-seven *catties* equal one hundred and twenty-six and one-tenth pounds.

The second cannon exhibited at the Museum is, apparently, a "Chinese copy" (date possibly 1500 or later), that is, a copy in cast-iron of a wrought-iron, built-up European gun of about 1400. It is made of bell-metal, silver being mixed with the iron, so that when struck with metal it gives forth a very clear sound.

CHARLES E. DANA.

* Words enclosed in brackets are not in the Chinese original.